CT610/310/600
(BKC-DIP) Product Specific Appendices
B&K Components Device Interface Protocol

Version 2.00.05

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Revision History

Version 2.00.05

1. Corrected error in System Parameter Note 12 (AM and FM were swapped).
2. Corrected Logical Zone name and code-set examples

Version 2.00.04

1. Changed System Parameter AEh description to "RS-232 Feedback" formally "RS-232 Update". The "Reply" setting may be used to automatically generate BKC-DIP Reply messages to allow uninitiated continuous feedback to an external controller. Whenever a change is detected in a logical zone and Reply is set, a BKC-DIP Reply message will be automatically generated which represents the new state of the affected logical zone i.e. Logical Zone and the current Preset Parameter value.

2. Added System Parameter Note 35 which describes RS-232 Feedback selections Disabled, Update, Reply and Both.

3. Added Zone Specific Parameters 24 –25 to allow access to a Logical Zones Volume and Mute setting.

4. Added Unit Parameters 2A-30 to allow access the status of Audio and Video detection, Tuner and Control I/O.

5. Edited the System Parameter and Preset Parameter notes. Defines the CT600 exceptions for use with the Tuner, Headphone and Front Panel Buttons/Switch controls.

Version 2.00.03

1. Corrected errors in the Zone Control Out System Parameter Notes 11, 12 & 13.

Version 2.00.02

1. Added System Parameters to allow BKC-DIP setup of Keypad Page/Device per each input and also the Keypad Receive ID.

Version 2.00.01

1. Added System Parameter to allow BKC-DIP control of Page/Event 1 and 2.

Version 2.00.00

1. The Initial Release of this document, which is referred to as BKC-DIP V2.00.00 documentation.

Introduction

Overview

The following is a supplement to B&K Components Device Interface Protocol (BKC-DIP) Protocol Document. This document contains the specific BKC-DIP implementation details for B&K Components' CT610/310/600 products.

Document Conventions

All numbers are assumed to be hexadecimal. Hexadecimal (or Hex for short) characters range from 0 to F.

For example:

The number 19 is the hexadecimal number 19 which is $(1 \times 16^1) + (9 \times 16^0)$ or 25 decimal. Similarly, EA is the hexadecimal number EA which is $(14 \times 16^1) + (10 \times 16^0)$ or 234 decimal. For clarity, some descriptions regarding numbers may use the *xx*h notation to remind the reader that the number is implicitly hexadecimal where *xx* are the hexadecimal characters 0 - F. Thus the previous examples would be 19h and EAh respectively, the "h" indicating hexadecimal.

Maximum values appearing in double quotes indicate that the parameter is an ASCII string.

For example:

"D" for the Z1 Title maximum value indicates that the title is a string with a maximum length of 0Dh (13 decimal) characters.

Italics indicate a non-literal string.

For example:

(00,G, P00, 0;*cs16*)

cs16 indicates the calculated checksum and does NOT literally appear in the data stream.

Important concepts are denoted by **NOTE:**

Appendix A, Preset Parameters

(0,G,P1=FF,0;*cs16*) Example of Get Z1 current preset title
(0,S,P1=A,1=24;*cs16*) Example of Set Z1 Preset 10 volume = 0 dB

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes Notes
00	Title	"D"	
01	Volume	28	Note 1
02	Source Input	B	Note 3
03	Audio Input	B	Note 3
04	Video Input	9	Note 9
05	Bass Level	C	Note 2
06	Treble Level	C	Note 2
07	Loudness	1	Note 4
08	Tuner AM Frequency	74, 81	Note 5, 5a
09	Tuner FM Frequency	67, CD	Note 6, 6a
0A	Tuner FM Mode	1	Note 7
0B	Headphone Mode	1	Note 8

Appendix A Preset Parameter Notes

(0,G,P1=FF,0;*cs16*) Example of Get Z1 current preset title
(0,S,P1=A,1=28;*cs16*) Example of Set Z1 Preset 10 volume = 0 dB

(**NOTE:** hex values denoted by *xx*h convention)

Note 1: 0h = -80 dB, 1h = -78 dB ... 28h = +0 dB
Note 2: 0h = -12.0 dB, 1h = -10 dB, ... 6h = 0.0 dB, ... Ch = +12.0 dB
Note 3: 0h = FM Tuner, 1h = AM Tuner, 2h = Dedicated, 3h = In1, 4h = In2, 5h = In3, 6h = In4, 7h = In5, 8h = In6, 9h = In7, Ah = In8, Bh = In9
NOTE: FM Tuner and AM Tuner do not have video sources, so selecting either as a video source will NOT change the current video source (i.e. the video source will remain on the currently selected video source).
NOTE: Source Input controls Audio and Video Inputs simultaneously, keeping them synchronized.
Note 4: 0h = off, 1h = on
Note 5: 10 kHz AM step tuning (USA)
(((*value* – 1) * 10) + 520) kHz, or
(((AM_kHz - 520) / 10) + 1) with
2Ah = 930 KHz; 00h indicates an uninitialized frequency.
If tuner stations programmed, last used station's frequency is used, else 520 kHz.
Note 5a: 9 kHz AM step tuning
(((*value* – 1)* 9) + 522) kHz, or
(((AM_kHz - 522) / 9) + 1) with
2Eh = 927 KHz; 00h indicates an uninitialized station.
If tuner stations programmed, last used station's frequency is used, else 522 kHz.

Note 6: 200 kHz FM step tuning (USA)
(((*value* – 1)* 0.20) + 87.5) MHz, or
(((FM_MHz - 87.5) /0.2) + 1) with
4Ch = 102.5 MHz; 00h indicates an uninitialized frequency.
If tuner stations programmed, last used station's frequency
is used, else 87.5 MHz.

Note 6a: 100 kHz FM step tuning
(((*value* – 1)* 0.10) + 87.5) MHz, or
(((FM_MHz - 87.5) /0.1) + 1) with 97h = 102.5 MHz; 00h
indicates an uninitialized frequency. If tuner stations
programmed, last used station's frequency
is used, else 87.5 MHz.

Note 7: 0h = Mono, 1h = Stereo

Note 8: 0h = Normal, 1h = HeadPhone (Headphone ignored in a CT600)

Note 9: 0h = Dedicated, 1h = In1, 2h = In2, 3h = In3, 4h = In4, 5h = In5, 6h = In6, 7h = In7, 8h = In8, 9h = In9

Appendix B, System Parameters

(0,G,S,17;*cs16*) Example of Get Input 9 Level Setting
(0,S,S,3="LASER";*cs16*) Example of Set Input 4 Title to "LASER"

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Input 1 Title	"5"	
01	Input 2 Title	"5"	
02	Input 3 Title	"5"	
03	Input 4 Title	"5"	
04	Input 5 Title	"5"	
05	Input 6 Title	"5"	
06	Input 7 Title	"5"	
07	Input 8 Title	"5"	
08	Input 9 Title	"5"	
09	Zone A IN Dedicated Title	"5"	
0A	Zone B IN Dedicated Title	"5"	
0B	Zone C IN Dedicated Title	"5"	
0C	Zone D IN Dedicated Title	"5"	
0D	Zone E IN Dedicated Title	"5"	
0E	Zone F IN Dedicated Title	"5"	
0F	Tuner Level	C	Note 1
10	Input 1 Level	C	Note 1
11	Input 2 Level	C	Note 1
12	Input 3 Level	C	Note 1
13	Input 4 Level	C	Note 1
14	Input 5 Level	C	Note 1
15	Input 6 Level	C	Note 1
16	Input 7 Level	C	Note 1
17	Input 8 Level	C	Note 1
18	Input 9 Level	C	Note 1
19	Zone A IN Dedicated Level	C	Note 1
1A	Zone B IN Dedicated Level	C	Note 1
1B	Zone C IN Dedicated Level	C	Note 1
1C	Zone D IN Dedicated Level	C	Note 1
1D	Zone E IN Dedicated Level	C	Note 1
1E	Zone F IN Dedicated Level	C	Note 1
1F	Input 1 Video	1	Note 2
20	Input 2 Video	1	Note 2
21	Input 3 Video	1	Note 2
22	Input 4 Video	1	Note 2
23	Input 5 Video	1	Note 2
24	Input 6 Video	1	Note 2
25	Input 7 Video	1	Note 2
26	Input 8 Video	1	Note 2
27	Input 9 Video	1	Note 2
28	Zone A IN Dedicated Video	1	Note 2
29	Zone B IN Dedicated Video	1	Note 2
2A	Zone C IN Dedicated Video	1	Note 2
2B	Zone D IN Dedicated Video	1	Note 2
2C	Zone E IN Dedicated Video	1	Note 2
2D	Zone F IN Dedicated Video	1	Note 2

2E	Zone A IN Dedicated Selection	1	Note 3
2F	Zone B IN Dedicated Selection	1	Note 3
30	Zone C IN Dedicated Selection	1	Note 3
31	Zone D IN Dedicated Selection	1	Note 3
32	Zone E IN Dedicated Selection	1	Note 3
33	Zone F IN Dedicated Selection	1	Note 3
34	Zone A IN Dedicated Release Time	1A	Note 17
35	Zone B IN Dedicated Release Time	1A	Note 17
36	Zone C IN Dedicated Release Time	1A	Note 17
37	Zone D IN Dedicated Release Time	1A	Note 17
38	Zone E IN Dedicated Release Time	1A	Note 17
39	Zone F IN Dedicated Release Time	1A	Note 17
3A	Zone A Mode	1	Note 4
3B	Zone B Mode	1	Note 4
3C	Zone C Mode	1	Note 4
3D	Zone D Mode	1	Note 4
3E	Zone E Mode	1	Note 4
3F	Zone F Mode	1	Note 4
40	Zone A Page/Event Selection	3	Note 5
41	Zone B Page/Event Selection	3	Note 5
42	Zone C Page/Event Selection	3	Note 5
43	Zone D Page/Event Selection	3	Note 5
44	Zone E Page/Event Selection	3	Note 5
45	Zone F Page/Event Selection	3	Note 5
46	Zone A Tuner Assignment	2	Note 6*
47	Zone B Tuner Assignment	2	Note 6*
48	Zone C Tuner Assignment	2	Note 6*
49	Zone D Tuner Assignment	2	Note 6*
4A	Zone E Tuner Assignment	2	Note 6*
4B	Zone F Tuner Assignment	2	Note 6*
4C	Zone A Left Level Control	1	Note 7
4D	Zone B Left Level Control	1	Note 7
4E	Zone C Left Level Control	1	Note 7
4F	Zone D Left Level Control	1	Note 7
50	Zone E Left Level Control	1	Note 7
51	Zone F Left Level Control	1	Note 7
52	Zone A Left Max Level	28	Note 8
53	Zone B Left Max Level	28	Note 8
54	Zone C Left Max Level	28	Note 8
55	Zone D Left Max Level	28	Note 8
56	Zone E Left Max Level	28	Note 8
57	Zone F Left Max Level	28	Note 8
58	Zone A Right Level Control	1	Note 7
59	Zone B Right Level Control	1	Note 7
5A	Zone C Right Level Control	1	Note 7
5B	Zone D Right Level Control	1	Note 7
5C	Zone E Right Level Control	1	Note 7
5D	Zone F Right Level Control	1	Note 7
5E	Zone A Right Max Level	28	Note 8
5F	Zone B Right Max Level	28	Note 8
60	Zone C Right Max Level	28	Note 8
61	Zone D Right Max Level	28	Note 8
62	Zone E Right Max Level	28	Note 8
63	Zone F Right Max Level	28	Note 8
64	Group a Code Set ID	80	Note 9

65	Group b Code Set ID	80	Note 9
66	Group c Code Set ID	80	Note 9
67	Group d Code Set ID	80	Note 9
68	Group e Code Set ID	80	Note 9
69	Group f Code Set ID	80	Note 9
6A	Group g Code Set ID	80	Note 9
6B	Group h Code Set ID	80	Note 9
6C	Group i Code Set ID	80	Note 9
6D	Group j Code Set ID	80	Note 9
6E	Group k Code Set ID	80	Note 9
6F	Group l Code Set ID	80	Note 9
70	Group m Code Set ID	80	Note 9
71	Group n Code Set ID	80	Note 9
72	Group o Code Set ID	80	Note 9
73	Group p Code Set ID	80	Note 9
74	Group q Code Set ID	80	Note 9
75	Group r Code Set ID	80	Note 9
76	Zone A Rear Remote In Setting	1	Note 10
77	Zone B Rear Remote In Setting	1	Note 10
78	Zone C Rear Remote In Setting	1	Note 10
79	Zone D Rear Remote In Setting	1	Note 10
7A	Zone E Rear Remote In Setting	1	Note 10
7B	Zone F Rear Remote In Setting	1	Note 10
7C	Zone A Control Out	5	Note 11
7D	Zone B Control Out	5	Note 11
7E	Zone C Control Out	5	Note 11
7F	Zone D Control Out	5	Note 11
80	Zone E Control Out	5	Note 11
81	Zone F Control Out	5	Note 11
82	Zone Control 1 Out	9	Note 25
83	Zone Control 2 Out	9	Note 25
84	Zone A Control Out Selected 0-7	FF	Note 12
85	Zone A Control Out Selected 8-11	0F	Note 12
86	Zone B Control Out Selected 0-7	FF	Note 12
87	Zone B Control Out Selected 8-11	0F	Note 12
88	Zone C Control Out Selected 0-7	FF	Note 12
89	Zone C Control Out Selected 8-11	0F	Note 12
8A	Zone D Control Out Selected 0-7	FF	Note 12
8B	Zone D Control Out Selected 8-11	0F	Note 12
8C	Zone E Control Out Selected 0-7	FF	Note 12
8D	Zone E Control Out Selected 8-11	0F	Note 12
8E	Zone F Control Out Selected 0-7	FF	Note 12
8F	Zone F Control Out Selected 8-11	0F	Note 12
90	Common Control 1 Out Select/Act 0-7	FF	Note 12
91	Common Control 1 Out Select/Act 8-11	0F	Note 12
92	Common Control 2 Out Select /Act 0-7	FF	Note 12
93	Common Control 2 Out Select /Act 8-11	0F	Note 12
94	RS-232 Control Out	FF	Note 13
95	Flasher Out	2	Note 26
96	Page/Event 1 Action	A	Note 14
97	Page/Event 1 Activated by Setting	4	Note 16
98	Page/Event 1 Level	28	Note 8
99	Page/Event 1 Turn off delay	1A	Note 17
9A	Page/Event 2 Action	A	Note 14
9B	Page/Event 2 Activated by Setting	4	Note 16

9C	Page/Event 2 Level	28	Note 8
9D	Page/Event 2 Turn off delay	1A	Note 17
9E	Front Panel Display Brightness	3	Note 18*
9F	Display RF	1	Note 2*
A0	Display Zone A	1	Note 2*
A1	Display Zone B	1	Note 2*
A2	Display Zone C	1	Note 2*
A3	Display Zone D	1	Note 2*
A4	Display Zone E	1	Note 2*
A5	Display Zone F	1	Note 2*
A6	Recall Volume in Preset	1	Note 2
A7	Preset Auto Naming	1	Note 2
A8	Favorite Preset Recall	1	Note 19
A9	RS-232 Port Enabled	1	Note 20
AA	RS-232 Baud Rate	8	Note 21
AB	RS-232 Receive ID	7F	Note 22
AC	RS-232 Transmit ID	7F	Note 22
AD	RS-232 Echo Enabled	1	Note 20
AE	RS-232 Feedback	3	Note 35
AF	RS-232 V2.0 Enabled	1	Note 20
B0	Front Panel Buttons Enabled	1	Note 20*
B1	Front Panel IR Remote Enabled	1	Note 20
B2	Memory Locked	1	Note 2
B3	Advanced Menu Visible	1	Note 23
B4	Front Panel IR Remote to Flasher Outs	1	Note 2
B5	RF to Flasher Outs	1	Note 2
B6	OSD Reply Mode	2	Note 27
B7	Front Panel Display Reply Mode	2	Note 27*
B8	Input 1 Input Mode	1	Note 4
B9	Input 2 Input Mode	1	Note 4
BA	Input 3 Input Mode	1	Note 4
BB	Input 4 Input Mode	1	Note 4
BC	Input 5 Input Mode	1	Note 4
BD	Input 6 Input Mode	1	Note 4
BE	Input 7 Input Mode	1	Note 4
BF	Input 8 Input Mode	1	Note 4
C0	Input 9 Input Mode	1	Note 4
C1	Zone A Dedicated Input Mode	1	Note 4
C2	Zone B Dedicated Input Mode	1	Note 4
C3	Zone C Dedicated Input Mode	1	Note 4
C4	Zone D Dedicated Input Mode	1	Note 4
C5	Zone E Dedicated Input Mode	1	Note 4
C6	Zone F Dedicated Input Mode	1	Note 4
C7	Power On Title 1	"10"	
C8	Power On Title 2	"10"	
C9	RF Remote Setting	1	Note 28*
CA	Page/Event 1 affects Control Out 1	1	Note 2
CB	Page/Event 2 affects Control Out 2	1	Note 2
CC	Stereo Left Calibrate Level Zone A	C	Note 29
CD	Stereo Left Calibrate Level Zone B	C	Note 29
CE	Stereo Left Calibrate Level Zone C	C	Note 29
CF	Stereo Left Calibrate Level Zone D	C	Note 29
D0	Stereo Left Calibrate Level Zone E	C	Note 29
D1	Stereo Left Calibrate Level Zone F	C	Note 29

D2	Stereo Right Calibrate Level Zone A	C	Note 29
D3	Stereo Right Calibrate Level Zone B	C	Note 29
D4	Stereo Right Calibrate Level Zone C	C	Note 29
D5	Stereo Right Calibrate Level Zone D	C	Note 29
D6	Stereo Right Calibrate Level Zone E	C	Note 29
D7	Stereo Right Calibrate Level Zone F	C	Note 29
D8	Page/Event 1 Assert Macro Number	FF	Note 30
D9	Page/Event 1 Deassert Macro Number	FF	Note 30
DA	Page/Event 2 Assert Macro Number	FF	Note 30
DB	Page/Event 2 Deassert Macro Number	FF	Note 30
DC	Zone A IN Dedicated Assert Macro Number	FF	Note 30
DD	Zone A IN Dedicated Deassert Macro Number	FF	Note 30
DE	Zone B IN Dedicated Assert Macro Number	FF	Note 30
DF	Zone B IN Dedicated Deassert Macro Number	FF	Note 30
E0	Zone C IN Dedicated Assert Macro Number	FF	Note 30
E1	Zone C IN Dedicated Deassert Macro Number	FF	Note 30
E2	Zone D IN Dedicated Assert Macro Number	FF	Note 30
E3	Zone D IN Dedicated Deassert Macro Number	FF	Note 30
E4	Zone E IN Dedicated Assert Macro Number	FF	Note 30
E5	Zone E IN Dedicated Deassert Macro Number	FF	Note 30
E6	Zone F IN Dedicated Assert Macro Number	FF	Note 30
E7	Zone F IN Dedicated Deassert Macro Number	FF	Note 30
E8	Auto BKC-DIP Set IR Generate Enable	1	Note 20
E9	Auto BKC-DIP Set IR Mask	3F	Note 31
EA	Auto BKC-DIP Set IR Transmit ID	80	Note 24
EB	Page/Event Activation Bitmap	3	Note 32
EC	RS232 Keypad Receive ID	FF	Note 33
ED	FM RS232 Keypad Page/Device	A3	Note 34
EE	AM RS232 Keypad Page/Device	A3	Note 34
EF	Dedicated RS232 Keypad Page/Device	A3	Note 34
F0	Input 1 RS232 Keypad Page/Device	A3	Note 34
F1	Input 2 RS232 Keypad Page/Device	A3	Note 34
F2	Input 3 RS232 Keypad Page/Device	A3	Note 34
F3	Input 4 RS232 Keypad Page/Device	A3	Note 34
F4	Input 5 RS232 Keypad Page/Device	A3	Note 34
F5	Input 6 RS232 Keypad Page/Device	A3	Note 34
F6	Input 7 RS232 Keypad Page/Device	A3	Note 34
F7	Input 8 RS232 Keypad Page/Device	A3	Note 34
F8	Input 9 RS232 Keypad Page/Device	A3	Note 34

Appendix B System Parameter Notes

(0,G,S,17;*cs16*) Example of Get Input 9 Level Setting
(0,S,S,3=”LASER”;*cs16*) Example of Set Input 4 Title to “LASER”

(**NOTE:** hex values denoted by *xx*h convention)

Note 1: 0h = -6.0 dB, 2h = -4.0 dB, ... 3h = 0.0 dB, ... 6h = +6.0 dB
Note 2: 0h = No, 1h = Yes
***Note:** Front display commands do not apply to a CT600.
Note 3: 0h = Manual, 1h = Auto
Note 4: 0h = Mono, 1h = Stereo
Note 5: 0h = None, 1h = Page/Event 1, 2h = Page/Event 2, 3h = Both
Note 6: 0h = Tuner 1, 1h = Tuner 2, 2h = Tuner 3
***NOTE:** Only Tuner 1 is supported in a CT600

Note 7: 0h = Fixed, 1h = Variable
Note 8: 0h = -80 MUTE dB, 1h = -78 dB ... 28h = +0 dB
Note 9: 0h = Group Disabled, 1h = Zone ID of 1, … 80h = Zone ID of 128
Note 10: 0h = Off, 1h = On,
Note 11: 0h = RS-232, 1h = Zone On, 2h = Zone Active, 3h = Zone Off, 4h = Selected Input, *****5h = Headphone
***NOTE:** Headphone is only valid for use in Zone A of a CT610 and CT310. Headphone is not applicable to a CT600.

Note 12: If corresponding Zone Control Out setting is Selected Input or Common Control Active Input, a 1 in the following bitmap position (which corresponds to the various inputs) will assert the control output when the appropriate input is selected (active):

Bit Position	Word	Description
0	Selected 0-7	FM Tuner
1	Selected 0-7	AM Tuner
2	Selected 0-7	Dedicated
3	Selected 0-7	Input 1
4	Selected 0-7	Input 2
5	Selected 0-7	Input 3
6	Selected 0-7	Input 4
7	Selected 0-7	Input 5
0	Selected 8-11	Input 6
1	Selected 8-11	Input 7
2	Selected 8-11	Input 8
3	Selected 8-11	Input 9
4-7	Selected 8-11	Reserved

For example,

(0,S,S,7E=4,88=01,89=04;*cs16*)

7E=4 indicates Zone C's control out state is based on the Selected Input

88=01 and 89=04 indicates that the control out state of Zone C will be on if the input is AM Tuner or Input 8, and off for all other selected inputs.

Note 13: If corresponding Control Out setting is RS-232 (0h), a 1 in the following bitmap position (which corresponds to the various inputs) will assert the control output when the appropriate input is selected:

Bit Position	Description
0	Zone A Control Out
1	Zone B Control Out
2	Zone C Control Out
3	Zone D Control Out
4	Zone E Control Out
5	Zone F Control Out
6	Common 1 Control Out
7	Common 2 Control Out

For example,
(0,S,S,7E=0,94=04;*cs16*)

7E=0 indicates Zone C's control out state is based on the RS-232 Control out register (94h)

94=04 indicates that Zones A, B, D, E, and F control out will be off (only if their appropriate Control Output settings (identifiers 7Ch – 81h) are set to use RS-232), and that Zone C's control output would be On (since its Control Output setting 74h = 0, RS-232) and bit 2 of the RS-232 Control out register (94h) is set.

Note 14: 0h = Off
1h = switch to Input 1
2h = switch to Input 2
3h = switch to Input 3
4h = switch to Input 4
5h = switch to Input 5
6h = switch to Input 6
7h = switch to Input 7
8h = switch to Input 8
9h = switch to Input 9
Ah = Reduce Volume

Note 15: 0h = Audio only, 1h = Video only, 2h = Audio and Video

Note 16: ***0h = Audio sense
***1h = Video sense
***2h = Audio or Video sense
3h = Common Control (1 for Page/Event 1, 2 for Page/Event 2)
4h = RS-232
***Note:** 0h, 1h and 2h are not valid Page/Event Activation settings while the Page/Event Action is set to Ah "Reduce Volume" see Note 14 listed above.

Note 17: Release Time in 1 second increments.
0h = 0 seconds, 1h = 1 second, 2h = 2 seconds, … 19h = 25 seconds, 1Ah = forever

Note 18: 0h = Off, 1h = Dim, 2h = Medium, 3h = Bright
***Note:** Front brightness commands do not apply to a CT600.

Note 19: 0h = "ENTER" Button required to recall Favorite Preset,
1h = Automatically recall Favorite Preset

Note 20: 0h = Normal, 1h = Disabled
***Note:** Front panel commands do not apply to a CT600.

Note 21: 0h = 1200
1h = 2400
2h = 9600
3h = 14400
4h = 19200
5h = 28800
6h = 38400
7h = 57600
8h = 115200

Note 22: Valid IDs are 00h to 7Fh. Receive IDs must be unique (to avoid ambiguity)

Note 23: 0h = Hidden, 1h = Visible

Note 24: 00h to 7Fh map directly to Transmit IDs 00h to 7Fh. 80h maps to the Global Transmit ID FFh.

Note 25: 0h = RS-232
1h = Any Zone On
2h = All Zones Off
3h = Selected Input
4h = Active Input
5h = Headphone (Headphone is ignored in a CT600)
6h = Common Control In 1 On
7h = Common Control In 1 Off
8h = Common Control In 2 On
9h = Common Control In 2 Off
NOTE: Common Control 2 not valid for CT310.
NOTE: Values 8h = Common Control In 2 On and 9h = Common Control In 2 Off are not valid for CT310.

Note 26: 0h = Off, 1h = Selected Input, 2h = All Inputs

Note 27: 0h = BKC-DIP V1.0 compliant, 1h = BKC-DIP V2.0 compliant with no attributes, 2h = BKC-DIP V2.0 compliant with attributes
NOTE: This parameter is reset to 0h after a cold/warm boot.

Note 28: 0h = Off, 1h = On
***NOTE:** RF Remote currently not supported.

Note 29: 0h = -12.0 dB, 1h = -10 dB, ... 6h = 0.0 dB, ... Ch = +12.0 dB
NOTE: The Stereo Left/Right Calibration Level is ignored by the unit when it's corresponding Zone Mode is set to Mono.

Note 30: 0h = Serial Macro 0, 1h = Serial Macro 1, … FDh = Serial Macro 253, FEh = Serial Macro 254, FFh = No Macro.
NOTE: If there is no corresponding valid Serial Macro, the end result is the same as if set to FFh = No Macro.

Note 31: Bitmap indicating which Hardware Zones (Zones A, B, C, D, E or F) to allow RS-232 data to be output. If the bit is set, the data will be output.

Zone A	01h
Zone B	02h
Zone C	04h
Zone D	08h
Zone E	10h
Zone F	20h

Thus an output mask of 2Bh would allow serial port data to be output on Zone A, Zone B, Zone D and Zone F, but NOT on Zone C and Zone E.

NOTE: The serial port data is always transmitted out the "primary" serial port connection, i.e. the RJ45 connector. An output mask of 00h will mask all data to the Hardware Zone outputs, but the data will still be transmitted to the primary serial port.

Note 32: Bitmap indicating state Page/Events via BKC-DIP. If the bit is set the Page/Event will be asserted, if it is clear the Page/Event will be deasserted assuming the Page/Event Activated By Setting parameter is set to BKC-DIP.

Page/Event 1	01h	enabled if 97h is set to 4
Page/Event 2	02h	enabled if 9Bh is set to 4

Note 33: 0h = 0, 1h = 1, … FDh = 253, FEh = 254, FFh = Global Receive ID.

Note 34: Page and Device are merged together into a single byte, where Page occupies the 3 most significant bits, and Device occupies the 5 least significant bits:

ppp ddddd

The maximum valid page is 4h (Page 5).
The maximum valid device is 13h (Device 20).

```
00h = Page 1, Device 1
01h = Page 1, Device 2
 :      :          :
12h = Page 1, Device 19
13h = Page 1, Device 20
14h – 1Fh = invalid Page/Device combination
20h = Page 2, Device 1
21h = Page 2, Device 2
 :      :          :
32h = Page 2, Device 19
33h = Page 2, Device 20
34h – 3Fh = invalid Page/Device combination
40h = Page 3, Device 1
41h = Page 3, Device 2
 :      :          :
52h = Page 3, Device 19
53h = Page 3, Device 20
54h – 5Fh = invalid Page/Device combination
60h = Page 4, Device 1
61h = Page 4, Device 2
 :      :          :
72h = Page 4, Device 19
73h = Page 4, Device 20
74h – 7Fh = invalid Page/Device combination
80h = Page 5, Device 1
81h = Page 5, Device 2
 :      :          :
92h = Page 5, Device 19
93h = Page 5, Device 20
```

Decomposing one of the above for clarification:

52h = Page 3, Device 19

52h = 010 10010 binary

Page = Most significant 3 bits: 010 binary, 2h = Page 3 (Note Page is offset by 1)

Device = Least significant 5 bits: 10010 binary, 12h = Device 19 (Note Device is offset by 1).

Note 35: 0h = Disabled, 1h = Update, 2 = Reply, 3 = Both (Update and Reply).

RS-232 Feedback Selection set to Reply

Continuous Parameter Feedback

With firmware 2.01 and greater, System Parameter AE has been changed to RS-232 Feedback Selection. Setting the RS-232 Feedback Selection to "Reply" allows the CT610/310/600 to automatically generate BKC-DIP Reply messages for changes to Volume, Bass, Treble, Loudness, Source and Tuner Frequency.

Below is an example of how the RS-232 Feedback Selection Reply may be used as Volume Feedback from the CT610/310/600 for use with an external controller.

Step 1)
First, set the CT610/310/600 system parameter AE = 2, RS-232 Feedback Selection set to Reply.

Next, initiate a Master Volume change by one of the following methods:

B&K code set 11 (Logical Zone 11) IR Master Volume Up
B&K code set 11 (Logical Zone 11) IR Master Volume Down
Front Panel Volume Encoder up or down while set to Logical Zone 11

The CT610/310/600 will automatically generate the following BKC-DIP Reply message command:

(0,R,P0B=FF,1=28;) Logical Zone 11 current Preset Parameter Volume value is set to 28 hex or 0dB (assumes 0dB is the current setting).

Step 2)
The external control device should be set to Poll for any BKC-DIP Reply messages and parse out the specific logical zone and current Preset Parameter value of interest, in this case the current Preset Parameter Volume value for Zone 11.

Step 3)
The external controller should use the CT610/310/600 Zone 11 current Preset Parameter Volume value of "28" hex to update its GUI or status in an appropriate fashion.

RS-232 Feedback Selection set to Update

Previous to 2.01, BKC-DIP messages "Update", "Get" and "Reply" commands were necessary for feedback. All current preset parameters for all logical zones in the CT610/310/600 are available at anytime. Typically, an external controller will use the Update message generated in response to a Front Panel button press or received B&K IR code-set, to formulate a BKC-DIP Get command. The returned BKC-DIP Reply message data may be used to extract the desired current Preset Parameter(s) and value(s) for use with updating its display requirements.

Below is an example of how the RS-232 Feedback Selection Update may be used to allow Volume Feedback from the CT610/310/600 for use with an external controller.

Step 1)
First, set the CT610/310/600 System Parameter AE = 1, RS-232 Feedback Selection set to Update.

Next, initiate a Master Volume change by any one of the following methods:

B&K code set 11 (Logical Zone 11) IR Master Volume Up B&K code set 11 (Logical Zone 11) IR Master Volume Down Front Panel Volume Encoder up or down while set to Logical Zone 11

Using an IR remote control set to B&K code set 11 (Logical Zone 11) a user presses the Master Volume + (Up) button.

The CT610/310/600 will generate the following BKC-DIP Update message command:

(0,U,I,0B=C4;) Update from Zone 11 via an IR message.

Step 2)
The external control device should be set to Poll for any BKC-DIP Update messages and parse out the specific BKC-DIP message of interest, in this case a Zone 11, IR Master Volume + (1=C4) "U,I,0B=C4". Note if another means of Master Volume up is used, such as the Front Panel Encoder Up, this would require a different message "U,F,0B=0B".

Step 3)
The external controller should generate a CT610/310/600 Get command for the specific current Preset Parameter of interest, in this case the current Preset Parameter Volume value. The command would look like the following BKC-DIP Get message:

(0,G,P0B=FF,1;) Get Zone 11 Volume setting.

Step 4)
Once the CT610/310/600 receives the above Get message it will generate a Reply message with the requested parameter, in this case the Reply for the current Preset Parameter Volume value for Zone 11. The command would look like the following BKC-DIP Reply message command:

(0,R,P0B=FF,1=28;) Zone 11 current Preset Volume value is set to 28 hex or 0dB.

Step 5)
The external controller may then use the CT610/310/600 Zone 11 current Preset Parameter Volume value of "28" hex to update its GUI or status in an appropriate fashion.

In addition to RS-232 Feedback Selections of Update and Reply, Disable and Both (Update and Reply) allow further versatility to set the best interface for the CT610/310/600 to an external controller.

Appendix C Tuner Station Parameters

Tuner stations are not supported in the CT610/310/600.

Appendix D Realtime Status Parameter

Real-time Status Parameters are not currently supported in the CT610/310/600.

Appendix E Unit Parameters

(0,G,F4,0;*cs16*) Example of Get Unit Name
(0,G,F4,1;*cs16*) Example of Get Version
(0,G,F4,C;*cs16*) Example of Get Active BKC-DIP Version

Parameter Identifier (in hex)	**Description**	**Notes**
00	Unit name	Note 1
01	Version	Note 2
02	Zone Description	Note 3
06	Amplifier Description	Note 4
07	Video Scan Rate (NTSC/PAL)	Note 5
08	AM steps 9kHz/10kHz	Note 6
09	FM steps 100kHz/200kHz	Note 7
0C	Active BKC-DIP Version	Note 8
0D	Software Time Stamp	Note 9
10	Serial Number	Note 10
11	Highest BKC-DIP Version Available	Note 11
12	Active Logical Zone Numbers	Note 12
13	Number of Inputs	Note 13
14	Number of Zones	Note 14
15	Number of Dedicated Inputs	Note 15
16	Number of Tuners	Note 16*
17	Number of Control Outputs	Note 17
18	Number of Control Inputs	Note 18
19	Number of Page/Events	Note 19
1A	Number of Input Boards	Note 20
1B	Number of Output Boards	Note 21
1C	Number of External Inputs	Note 22
1D	Number of Zones and Detectors	Note 23
1E	Receive ID	Note 24
1F	Transmit ID	Note 24
20	Input Bitmap LSB	Note 25
21	Input Bitmap MSB	Note 25
22	Output Bitmap LSB	Note 26
23	Output Bitmap LSB	Note 26
24	Dedicated Input Bitmap LSB	Note 27
25	Dedicated Input Bitmap LSB	Note 27
26	Serial Macro Free Space MSB	Note 28
27	Serial Macro Free Space LSB	Note 28
28	RF Remote	Note 29
29	Group Code Set List	Note 30
2A	Audio Input Detect Bitmap LSB	Note 31
2B	Audio Input Detect Bitmap MSB	Note 31
2C	Video Input Detect Bitmap LSB	Note 31
2D	Video Input Detect Bitmap MSB	Note 31
2E	Control Input Detect Bitmap	Note 32
2F	Control Output Status Bitmap	Note 33
30	Tuner Detect Status Bitmap	Note 34

Appendix E, Unit Info Parameter Notes

Note 1: String indicating Name
Note 2: String indicating software version
Note 3: String indicating Zone capabilities
Note 4: String describing amplifier capabilities
Note 5: String describing Video scan rate ("NTSC" or "PAL")
Note 6: String describing AM Step size ("9kHz" or "10kHz")
Note 7: String describing FM Step size ("100kHz" or "200kHz")
Note 8: String describing currently active BKC-DIP version.
This may not necessarily be the most sophisticated (highest) version of BKC-DIP the device can support, but the unit can be forced to communicate using older more restrictive forms of BKC-DIP for backwards compatibility.
Note 9: String indicating date/time which software was compiled
Note 10: String containing Unit's Serial Number
Note 11: String indicating highest BKC-DIP version unit can support. This can be different than the currently active BKC-DIP version, as the unit can be forced to communicate using older more restrictive forms of BKC-DIP for backwards compatibility.
Note 12: String containing list of all active Logical Zone Numbers in the unit. Each logical zone is delimited by white space, and the values are in hexadecimal.

For example:
"0 1 2 3 4 5 6 7"
indicates that there are 8 Logical zones, 0-7 currently present in the unit.

As another example
"0 3 6 9 C 1D"
indicates that there are 6 Logical zones (0h, 3h, 6h, 9h, Ch, and 1Dh) currently present in the unit.

Note 13: Number of Inputs (including AM and FM if any tuners present)
Note 14: Number of Hardware Zones (CT610/600 = 6, CT310 = 3)
Note 15: Number of Dedicated Inputs (CT610/600 = 6, CT310 = 3)
Note 16: Number of Tuners (could be 0) *(max 1 Tuner in a CT600)
Note 17: Number of Control Outputs
Note 18: Number of Control Inputs
Note 19: Number of Page/Events (CT610/600 = 2, CT310 = 1)
Note 20: Number of Input Boards
Note 21: Number of Output Boards (CT610/600 = 2, CT310 = 1)
Note 22: Number of External Inputs (excluding AM and FM)
Note 23: Number of Zones and Detectors
Note 24: Current RS-232 Receive/Transmit ID, shadows System setting
Note 25: Bitmaps indicating which inputs are valid with the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Input Represented
LSB	0	FM
LSB	1	AM
LSB	2	Zone Dedicated IN
LSB	3	In 1
LSB	4	In 2

LSB	5	In 3
LSB	6	In 4
LSB	7	In 5
MSB	0	In 6
MSB	1	In 7
MSB	2	In 8
MSB	3	In 9

For example, a fully loaded CT610 (3 input boards, 2 output boards, and tuner modules) would have the following return values:

20=FF Indicates FM, AM, Zone Dedicated IN, In 1-5 valid
21=F Indicates In 6-9 valid

In a minimal CT610 configuration (2 input boards, 1 output board, and no tuner modules), the return value would be

20=FC Indicates Zone Dedicated Input and In 1-5 valid, No FM, AM
21=01 Indicates In 6 valid, No In 7-9

Note 26: Bitmaps indicating which outputs are valid with the current hardware configuration. If the bit is set (i.e. 1) that particular output is valid.

LSB/MSB Word	Bit	Output Represented
LSB	0	Zone A
LSB	1	Zone B
LSB	2	Zone C
LSB	3	Zone D
LSB	4	Zone E
LSB	5	Zone F
LSB	6	unused
LSB	7	unused

For example, a fully loaded CT610 (3 input boards, 2 output boards, and tuner modules) would have the following return values:

22=3F Indicates Zones A-F valid
23=0 Always 0

In a minimal CT610 configuration (2 input boards, 1 output board, and no tuner modules), the return value would be

22=07 Indicates Zones A-C valid, No D-F
23=00 Always 0

NOTE: The MSB currently is always 0 as there is a maximum of 6 possible Zone outputs in the CT series. This parameter is provided in the protocol for future expandability should there be more than 8 Zone outputs.

Note 27: In the current CT series there is a Dedicated Zone input associated with each Zone Output. Thus, these values are the same as the Output Bitmap parameters. They are provided in the protocol for future expandability should there be a difference between Zone Dedicated inputs and Zone Outputs.

Note 28: The MSB and LSB form a 16 bit value indicating how much Serial Macro free space currently remains in the unit.

```
26=8       (MSB)
27=0       (LSB)
```

Indicates 800h (2048 decimal) bytes free remaining serial macro space.

```
26=1       (MSB)
27=E4      (LSB)
```

Indicates 1E4h (484 decimal) bytes free remaining serial macro space.

Note 29: 0h = No RF Remote support, 1h = RF Remote supported

Note 30: String containing list of all Group Code Sets (Zone IDs)in the unit. Each Code Set (Zone ID) is delimited by white space, and the values are in hexadecimal.

For example:

"0 B C D E F 10 0 0 0 0 0 0 0 0 0 0"

indicates that there are 17 Groups with Code Sets (Zone IDs):

Group	Code Set (Zone ID)
0	0h
a	3h
b	4h
c	Bh
d	Ch
e	Dh
f	Eh
g	10h
h	0h
i	0h
j	0h
k	0h
l	0h
m	0h
n	0h
o	0h
p	0h
q	0h
r	0h

Note 31: Bitmaps indicating the current Audio or Video Input Detect status for all valid audio and video inputs in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Audio or Video Input Represented
LSB	0	Dedicated IN A
LSB	1	Dedicated IN B
LSB	2	Dedicated IN C
LSB	3	Dedicated IN D
LSB	4	Dedicated IN E
LSB	5	Dedicated IN F
LSB	6	In 1
LSB	7	In 2
MSB	0	In 3
MSB	1	In 4
MSB	2	In 5
MSB	3	In 6
MSB	4	In 7
MSB	5	In 8
MSB	6	In 9

For example, a fully loaded CT610 (3 input boards, 2 output boards, and tuner modules) would have the following return values:

Audio Input Detect

2A=FF	Indicates audio detected on Dedicated Zone Inputs A thru F and Inputs 1 thru 9
2B=1F	Indicates audio detected on Dedicated Zone Inputs A thru F and Inputs 1, 2, and 3.

Video Input Detect

2C=FF	Indicates video detected on Dedicated Zone Inputs A thru F and Inputs 1 thru 9
2D=1F	Indicates video detected on Dedicated Zone Inputs A thru F and Inputs 1, 2, and 3.

Note 32: Bitmaps indicating the current Control Input Detect Status for all valid control inputs in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Control Input Represented
LSB	0	Control IN 1
LSB	1	Control IN 2

Control Input Detect

2E=3	Indicates control in detected on both Control IN 1 and IN 2.

Note 33: Bitmaps indicating the current Control Output Status for all valid control outputs in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Control Output Represented
LSB	0	Control OUT A
LSB	1	Control OUT B
LSB	2	Control OUT C
LSB	3	Control OUT 1
LSB	4	Control OUT D
LSB	5	Control OUT E
LSB	6	Control OUT F
LSB	7	Control OUT 2

Control Output Status

2F=8	Indicates control out 1 is set.
2F=F0	Indicates control out 2 is set.

Note 34: Bitmaps indicating the current Tuner Detect Status for all valid tuners in the current hardware configuration. If the bit is set (i.e. 1) that particular input is valid.

LSB/MSB Word	Bit	Tuner Status Represented
LSB	0	Station Detect for Tuner 1
LSB	1	Stereo Detect for Tuner 1
LSB	2	Station Detect for Tuner 2
LSB	3	Stereo Detect for Tuner 2
LSB	4	Station Detect for Tuner 3
LSB	5	Stereo Detect for Tuner 3

Tuner Input Detect

30=3	Indicates Tuners 1 is receiving a Stereo station and the Station Detect signal is set.
30=F	Indicates Tuners 1 and 2 are both receiving a Stereo station and both tuners are receiving a valid Station Detect signal strength.
30=3F	Indicates Tuners 1 and 2 and 3 are all receiving a Stereo station and the Tuners are receiving a valid Station Detect signal strength.

Appendix F IR Commands

(0,S,I,1=2;*cs16*) Example of Set Zone 1 IR Save
(0,S,I,1=24;*cs16*) Example of Set Zone 1 IR Volume +

IR Command (in hex)	IR Description
02	SAVE
04	(BALANCE) RIGHT
0C	ENTER
14	ALL B&K POWER OFF
15	ALL B&K POWER ON
16	ALL B&K VOL DOWN
17	ALL B&K VOL UP
18	STATION +
19	ALL B&K 0 dB VOL
1A	ALL B&K -20 dB VOL
1B	ALL B&K -40 dB VOL
1D	ALL B&K -60 dB VOL
1E	ALL B&K MUTE
24	MASTER VOL +
38	TUNE +
3F	OSD MENU 1
40	POWER ON
41	OSD MENU 2
42	OSD MENU 3
43	OSD MENU 4
45	POWER (TOGGLE)
48	FREQ
4C	2
52	INPUT 6
5A	ZONE_DIRECT_INPUT
5B	ANALOG SOURCE -
5C	8
5D	ANALOG SOURCE +
5E	VIDEO SOURCE -
5F	VIDEO SOURCE +
60	INPUT 3
63	PRESET -
65	SOURCE -
66	SOURCE +
6C	5
6E	AM
70	TUNER
71	FM
74	UP
76	INPUT 9
7C	0
80	POWER OFF
8C	1
90	INPUT 2
94	+10
9C	7
9E	TREBLE -
9F	TREBLE +
A0	INPUT 1
A6	BASS -
A7	BASS +

AC	4
B0	INPUT 4
B4	DOWN
BE	EXIT
C0	MUTE
C4	MASTER VOL -
C8	BAND
CC	3
CF	RIGHT
D0	INPUT 7
D1	LEFT
D2	PRESET +
D7	STEREO / MONO
D8	TUNE -
DC	9
E0	INPUT 8
E8	STATION -
EC	6
F0	INPUT 5
F1	MUTE ON
F2	MUTE OFF
F3	LOUDNESS (TOGGLE)
F4	MENU
F8	(BALANCE) LEFT
FC	ZONE

Appendix G, Front Panel Commands

(0,S,F,1=1;*cs16*) Example of Set Zone 1 FP Sleep
(0,S,F,1=A;cs*16*) Example of Set Zone 1 FP Volume Down
Note: The below commands do apply to a CT600.

Identifier (in hex)	Front Panel Button/Switch	Function
01	SLEEP	Unit Sleep Toggle
02	PRESET	Increment Preset
03	ENTER	Enter
04	SAVE	Save
05	DOWN	Down
06	UP	Up
07	SOURCE	Increment Source
08	MENU	Menu
09	ZONE	Increment Zone
0A	ENCODER DOWN	Vol/Encoder Knob Down
0B	ENCODER UP	Vol/Encoder Knob Up
0C	CHORD 0: SLEEP + DOWN + UP	Advanced Settings Visible
0D	CHORD 1: SLEEP + DOWN + SOURCE	Restore User Preference Memory
0E	CHORD 2: SLEEP + UP + ZONE	Factory Reset Unit

Appendix H, Valid ASCII Display Characters

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789 -+/?='

Appendix I, Special Display Characters

Character (in hex)	Description
0B	blank space
64	no tick symbol (long dash)
65	left 1/4 tick symbol
66	left middle 1/4 tick symbol
67	right middle 1/4 tick symbol
68	right 1/4 tick symbol
72	1/6 of solid vertical bar
73	2/6 of solid vertical bar
74	3/6 of solid vertical bar
75	4/6 of solid vertical bar
76	5/6 of solid vertical bar
77	6/6 of solid vertical bar
6E	satellite symbol
79	G clef symbol
7A	right facing arrow
7B	left facing arrow
7C	upward facing arrow
7D	downward facing arrow
7E	key symbol
71	heart symbol

Appendix J, ASCII Table

Decimal	Hex	ASCII	Decimal	Hex	ASCII
0	0	xx	64	40	@
1	1	xx	65	41	A
2	2	xx	66	42	B
3	3	xx	67	43	C
4	4	xx	68	44	D
5	5	xx	69	45	E
6	6	xx	70	46	F
7	7	xx	71	47	G
8	8	xx	72	48	H
9	9	xx	73	49	I
10	A	xx	74	4A	J
11	B	xx	75	4B	K
12	C	xx	76	4C	L
13	D	xx	77	4D	M
14	E	xx	78	4E	N
15	F	xx	79	4F	O
16	10	xx	80	50	P
17	11	xx	81	51	Q
18	12	xx	82	52	R
19	13	xx	83	53	S
20	14	xx	84	54	T
21	15	xx	85	55	U
22	16	xx	86	56	V
23	17	xx	87	57	W
24	18	xx	88	58	X
25	19	xx	89	59	Y
26	1A	xx	90	5A	Z
27	1B	xx	91	5B	[
28	1C	xx	92	5C	\
29	1D	xx	93	5D	]
30	1E	xx	94	5E	^
31	1F	xx	95	5F	_
32	20		96	60	`
33	21	!	97	61	a
34	22	"	98	62	b
35	23	#	99	63	c
36	24	$	100	64	d
37	25	%	101	65	e
38	26	&	102	66	f
39	27	'	103	67	g
40	28	(	104	68	h
41	29	)	105	69	i
42	2A	*	106	6A	j
43	2B	+	107	6B	k
44	2C	,	108	6C	l
45	2D	-	109	6D	m
46	2E	.	110	6E	n
47	2F	/	111	6F	o
48	30	0	112	70	p
49	31	1	113	71	q
50	32	2	114	72	r
51	33	3	115	73	s
52	34	4	116	74	t
53	35	5	117	75	u
54	36	6	118	76	v
55	37	7	119	77	w
56	38	8	120	78	x
57	39	9	121	79	y
58	3A	:	122	7A	z
59	3B	;	123	7B	{
60	3C	<	124	7C	|
61	3D	=	125	7D	}
62	3E	>	126	7E	~
63	3F	?	127	7F	xx

NOTE: xx indicates non printable character

Appendix K, LED Mapping

```
LED Buffer 0
01h = UP
02h = ZONE
04h = MENU
08h = SOURCE
10h = PRESET
20h = SLEEP
40h = ENTER
80h = SAVE

LED Buffer 1
01h = DOWN
02h = <NOT USED>
04h = <NOT USED>
08h = <NOT USED>
10h = <NOT USED>
20h = <NOT USED>
40h = <NOT USED>
80h = <NOT USED>
```

NOTE: Due to the front panel electronics, all LEDs are in the same electrical bank. Only one of the LEDs should be active at a time.

NOTE: Due to the lack of front panel electronics, LEDs commands do not apply to a CT600.

Appendix L, X (executive) Commands

The following is a list of the supported Executive commands and details regarding their usage:

Recall Preset Command: (*receiveID*, X, 0, *z=nn*; *cs16*)

Zone *z* Preset *nn* is recalled to the current preset. Similar to the "G" get and "S" set commands, *nn* can range from 00h – FDh, however it **CANNOT** be FFh for the current preset (as recalling the current preset has no meaning).

NOTE: *nn* of FE is reserved for future expansion.

(00, X, 0, 1=4;*cs16*)	Recall Zone 1 Preset 4 to current preset
(00, X, 0, 2=7;*cs16*)	Recall Zone 2 Preset 7 to current preset

Save Preset Command: (*receiveID*, X, 1, *z=nn*, *autoNameMode*; *cs16*)

The current preset is saved to Zone *z* Preset *nn*. . Similar to the "G" get and "S" set commands, *nn* can range from 00h – FDh, however it **CANNOT** be FFh for the current preset (as saving the current preset has no meaning).

NOTE: *nn* of FE is reserved for future expansion.

(00, X, 1, 1=3;*cs16*)	Save current preset to Zone 1 Preset 3
(00, X, 1, 2=9;*cs16*)	Save current preset to Zone 2 Preset 9

The *autoNameMode* specifier can take on the following values with the following meanings:

0	Auto Name Preset, based upon state of System parameter Preset Auto Naming
1	Do not Auto Name, regardless of System parameter Preset Auto Naming
2	Force Auto Name, regardless of System parameter Preset Auto Naming

(00, X, 1, 1=8, 0;*cs16*)	Save current preset to Zone 1 Preset 8 Auto Name based on Preset Auto Naming parameter
(00, X, 1, 1=8, 1;*cs16*)	Save current preset to Zone 1 Preset 8 Do not Auto Name, preserve Preset Title
(00, X, 1, 1=8, 2;*cs16*)	Save current preset to Zone 1 Preset 8 Force Auto Naming, overwriting Preset Title

NOTE: If Preset Auto Naming is active, the preset title will be overwritten.

NOTE: The *autoNameMode* specifier is optional. If it is omitted its value defaults to 0, so the preset title is Auto Named based on the state of the System parameter Preset Auto Naming.

Power State Command: (*receiveID*, X, 2, *z=onOff*; *cs16*)

Zone *z*'s power state may be controlled using this command. The *onOff* parameter may take on the values of 1 or 0 for "on" or "off (Sleep)" respectively.

(00, X, 2, 1=1;*cs16*) Turn Z1 power on (unit not in Sleep)
(00, X, 2, 2=0;*cs16*) Turn Z2 power off (unit in Sleep)

NOTE: A Power State Command "on" is referred to as a "Warm Boot".

Cold Boot Command: (*receiveID*, X, 6; *cs16*)

This forces the unit to do a "Cold Boot", which is the same sequence of events that occur when the unit is turned on from the power on/off switch. This differs from a "Warm Boot" (Power State Command with On/Off state of 1) in that all of the unit's hardware is re-initialized.

NOTE: After issuing a Cold Boot command, the unit's communication port is reinitialized. Communication will have to be re-established. The unit cannot receive BKC-DIP commands until the Update Unit "BKC-DIP ACTIVE" reply has been transmitted by the unit (see Update Command below for further details).

Factory Reset Command: (*receiveID*, X, 7; *cs16*)

This command executes the factory-reset sequence in the unit. The factory reset returns the state of the unit to its original factory settings.

WARNING!: Issuing a Factory Reset Command will destroy all user modified data in the unit (preset, system settings, etc.).

NOTE: After issuing a Factory Reset command, the unit's communication port is reinitialized. Communication will have to be re-established. The unit cannot receive BKC-DIP commands until the Update Unit "BKC-DIP ACTIVE" reply has been transmitted by the unit (refer to the Update Command in the **BKC-DIP Specification** for further details).

Unsupported Executive Commands

The following Executive Commands are **not** supported by the CT610/310/600:

Noise Generator State Command: (*receiveID*, X, 3, *noiseState; cs16*)
Noise Steering Command: (*receiveID*, X, 4, *speakerIndex=onOff*, ... speakerIndex=*onOff*; *cs16*)
Noise Increment Command: (*receiveID*, X, 5; *cs16*)
Reinitialize BKC-DIP State Command: (*receiveID*, X, 8; *cs16*)
Test Tone State Command: (*receiveID*, X, 9, *level*; *cs16*)
Mute State Command: (*receiveID*, X, A, *z=muteState*; *cs16*)

Appendix M, Error Logs

(0,G,E,0;*cs16*) Example of Get Primary Preset Errors
(0,S,E,0=0;cs*16*) Example of Set Primary Preset Errors

Identifier (in hex)	**Description**	**Note**
00	Primary Preset Error Log	Note 1
01	Secondary Preset Error Log	Note 1
02	Primary System Error Log	Note 2
03	Secondary System Error Log	Note 2
04	Primary Preserved Error Log	Note 3
05	Secondary Preserved Error Log	Note 3
06	Serial Number Error Log	Note 4
07	Signature Error Log	Note 5
08	Non Volatile Write Error Log	Note 6

Appendix M, Error Logs Parameter Notes

General Note 1: If error is detected in the primary preset memory, the error is logged as a primary error, then the settings are recovered from the secondary (backup) settings. If the secondary settings are corrupted, the error is logged as a secondary error, and the settings are forced to their default value.

General Note 2: Error Logs are not reset by factory reset. To clear error logs, the value of 0 must explicitly be written to each identifier via a BKC-DIP set (S), command.

Note 1: Indicates data corruption in Preset primary/secondary settings.
Note 2: Indicates data corruption in System primary/secondary settings.
Note 3: Indicates data corruption in Preserved primary/secondary settings.
Note 4: Indicates data corruption of one of the redundant serial number entries.
Note 5: Indicates data corruption of one of the redundant signature entries.
Note 6: Indicates general low level write error to non-volatile memory device.

Appendix N, Zone Specific Parameters

(0,G,Z1,0;*cs16*) Example of Get Zone 1 Title
(0,S,Z9,2=3;*cs16*) Example of Set Zone 9 Audio Input Power On Preference to In 1

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Title	"B"	
01	Audio Input Power On Setting	1	Note 1
02	Audio Input Power On Preference	B	Note 2
03	Video Input Power On Setting	1	Note 1
04	Video Input Power On Preference	9	Note 12
05	Volume Power On Setting	1	Note 1
06	Volume Power On Preference	28	Note 3
07	Bass Power On Setting	1	Note 1
08	Bass Power On Preference	C	Note 4
09	Treble Power On Setting	1	Note 1
0A	Treble Power On Preference	C	Note 4
0B	Loudness Power On Setting	1	Note 1
0C	Loudness Power On Preference	1	Note 5
0D	AM Frequency Power On Setting	1	Note 1
0E	AM Frequency Power On Preference	74,81	Note 6,6a
0F	FM Frequency Power On Setting	1	Note 1
10	FM Frequency Power On Preference	67,CD	Note 7,7a
11	FM Stereo Mode Power On Setting	1	Note 1
12	FM Stereo Mode Power On Preference	1	Note 8
13	Zone List	"2F"	Note 10
14	Favorite Presets 0-7 Indicators	FF	Note 9
15	Favorite Presets 8-15 Indicators	FF	Note 9
16	Favorite Presets 16-23 Indicators	FF	Note 9
17	Favorite Presets 24-31 Indicators	FF	Note 9
18	Favorite Presets 32-39 Indicators	FF	Note 9
19	Favorite Presets 40-47 Indicators	FF	Note 9
1A	Favorite Presets 48-55 Indicators	FF	Note 9
1B	Favorite Presets 56-63 Indicators	FF	Note 9
1C	Favorite Presets 64-71 Indicators	FF	Note 9
1D	Favorite Presets 72-79 Indicators	FF	Note 9
1E	Favorite Presets 80-87 Indicators	FF	Note 9
1F	Favorite Presets 88-95 Indicators	FF	Note 9
20	Favorite Presets 96-99 Indicators	0F	Note 9
21	Absolute/Relative Setting	1	Note 11
22	Left (Stereo) Hardware Group Mask	3F	Note 13
23	Right Hardware Group Mask	3F	Note 13
24	Zone Power State	"2F"	Note 10

Appendix N, Zone Specific Parameter Notes

```
      (0,G,Z1,0;cs16)   Example of Get Zone 1 Title
      (0,S,Z9,2=3;cs16) Example of Set Zone 9 Audio Input Power On
                        Preference to In 1
Note 1:  0h = Last Used
         1h = Preferred Value
Note 2:  0h = FM Tuner
         1h = AM Tuner
         2h = Dedicated Zone In
         3h = In1
         4h = In2
         5h = In3
         6h = In4
         7h = In5
         8h = In6
         9h = In7
         Ah = In8
         Bh = In9
Note 3:  0h = -80 dB, 1h = -78 dB ... 28h = +0 dB
Note 4:  0h = -12.0 dB, 1h = -10 dB, ... 6h = 0.0 dB, ... Ch = +12.0 dB
Note 5:  0h = off
         1h = on
Note 6:  10 kHz AM step tuning (USA)
            (((value - 1) * 10) + 520) kHz, or
            (((AM_kHz - 520) / 10) + 1) with
            2Ah = 930 KHz;  00h indicates an uninitialized frequency.
            If tuner stations programmed, last used station's frequency
            is used, else 520 kHz.
Note 6a: 9 kHz AM step tuning
            (((value - 1)* 9) + 522) kHz, or
            (((AM_kHz - 522) / 9) + 1) with
            2Eh = 927 KHz;  00h indicates an uninitialized station.
            If tuner stations programmed, last used station's frequency
            is used, else 522 kHz.
Note 7:  200 kHz FM step tuning (USA)
            (((value - 1)* 0.20 ) + 87.5) MHz, or
            (((FM_MHz - 87.5) /0.2) + 1) with
            4Ch = 102.5 MHz; 00h indicates an uninitialized frequency.
            If tuner stations programmed, last used station's frequency
            is used, else 87.5 MHz.
Note 7a: 100 kHz FM step tuning
            (((value - 1)* 0.10 ) + 87.5) MHz, or
            (((FM_MHz - 87.5) /0.1) + 1) with 97h = 102.5 MHz; 00h
            indicates an uninitialized frequency.  If tuner stations
            programmed, last used station's frequency
            is used, else 87.5 MHz.
Note 8:  0h = Mono
         1h = Stereo
Note 9:  The Favorite Preset Indicators are bitmaps.  Each register
         represents 8 presets.  The lowest preset number of the 8
         presets corresponds to the least significant bit (right-most
         bit, bit 0), while the highest preset number of the 8
         corresponds to the most significant bit (left-most bit, bit
         7).  If a bit is set (i.e. a "1" in that position) the
```

corresponding preset is a Favorite for that Logical Zone.

For example, given the following Favorite Preset Indicator settings:

Identifier	Value	Comment
14	01h	Preset 0 is Favorite
15	80h	Preset 15 is Favorite
16	87h	Preset 16, 17, 18, and 23 Favorite
17	C0h	Preset 30 and 31 Favorite
18	E0h	Preset 37, 38, and 39 Favorite
19	F0h	Preset 44, 45, 46, and 47 Favorite
1A	03h	Preset 48 and 49 Favorite
1B	07h	Preset 56, 57, and 58 Favorite
1C	0Fh	Preset 64, 65, 66, and 67 Favorite
1D	00h	No Favorites in Presets 72-79
1E	11h	Presets 80 and 84 Favorite
1F	FFh	Preset 88, 89, 90, 91, 92, 93, 94, and 95 Favorite
20	0Fh	Preset 96, 97, 98 and 99 Favorite

Specifically looking at the Preset 16-23 Favorite Indicator (identifier 15h) as an example given its value of 87h:

Bit	Value	Comment
0	1	Preset 16 is Favorite
1	1	Preset 17 is Favorite
2	1	Preset 18 is Favorite
3	0	Preset 19 is not Favorite
4	0	Preset 20 is not Favorite
5	0	Preset 21 is not Favorite
6	0	Preset 22 is not Favorite
7	1	Preset 23 is Favorite

Note 10: The Zone List is a string indicating the Zone Hardware (Zones A, B, C, D, E or F) associated with the particular Logical Zone. The format of the string is Zone Hardware specifiers delimited by whitespace. Each Zone Hardware specifier has the format:

ZoneLetter.channelSpecifier

Where *ZoneLetter* can be A, B, C, D, E, or F, seperated by a period (referred to a "dot"), and the *ChannelSpecifier* can be L or R (signifying the Left or Right hardware channel).

An example of a Zone List is:

"A.L A.R C.L D.R F.L F.R"

In this example, this particular logical zone encompasses Zone A Left and Right, Zone C Left, Zone D Right, and Zone F Left and Right.

Note 11: 0h = relative, 1h = absolute

Note 12: 0h = Dedicated
1h = In1
2h = In2
3h = In3
4h = In4
5h = In5
6h = In6
7h = In7
8h = In8
9h = In9

Note 13: Bitmaps indicating which hardware zone outputs are associated with the Group which has this Zone (code set). If the bit is set (i.e. 1) that particular hardware zone output is valid.

Bit	Output Represented
0	Zone A
1	Zone B
2	Zone C
3	Zone D
4	Zone E
5	Zone F
6	unused
7	unused

NOTE: If hardware zone is configured in Stereo Mode, the appropriate bits of the Right Group Mask are ignored, and the Left Group Mask bits determine the grouping for both the Left and Right sides of the hardware zone.

Note 14: Bitmaps indicating which hardware zone outputs are associated with the Group which has this Zone (code set). If the bit is set (i.e. 1) that particular hardware zone output is valid.

Appendix O, Macro Parameters

```
(0,G,M0=10,5;cs16)          Example of Get Serial Macro 16 Message
(0,S,M0=1,5="Hello";cs16)   Example of Set Serial Macro 1 Message
```

Supported Macro Types

Type	Description
0	Serial Macro Type

Serial Macro Parameters

Parameter Identifier (in hex)	Description	Parameter Max Values (in hex)	Formatting Notes
00	Serial Macro Trigger ID	80	Note 1
01	Serial Macro Trigger Code	FF	Note 2
02	Serial Macro Scrollable	1	Note 3
03	Serial Macro Baud Rate	8	Note 4
04	Serial Macro Output Mask	3F	Note 5
05	Serial Macro Message	2000	Note 6
06	Serial Macro Message Size MSB	20	Note 7
07	Serial Macro Message Size LSB	FF	Note 7
08	Serial Macro Free Space MSB	20	Note 8
09	Serial Macro Free Space LSB	FF	Note 8

General Notes Regarding Serial Macros

All the parameters of a serial macro are stored with that particular macro. If every identifier is not specified, default settings are used. The following documents the default settings used for the particular identifiers:

Parameter (in hex)	Description	Default Value
00	Serial Macro Trigger ID	0
01	Serial Macro Trigger Code	0
02	Serial Macro Scrollable	0
03	Serial Macro Baud Rate	*
	**Same as System Parameter AAh, the System RS-232 Baud Rate*	
04	Serial Macro Output Mask	3F
05	Serial Macro Message	"EMPTY"

Serial Macro Parameter Notes

(0,G,M0=10,5;*cs16*) Example of Get Serial Macro 16 Message
(0,S,M0=1,5="Hello";*cs16*) Example of Set Serial Macro 1 Message

Note 1: 0h = Zone ID of 0, 1h = Zone ID of 1, … 80h = Zone ID of 128
Note 2: 0h = IR Code 0, 1h = IR Code 1, … FFh = IR Code 255
Note 3: 0h = No
1h = Yes
Scrollable indicates that a Serial Macro Messages will be transmitted every time an IR code Trigger Code is received. Non-scrollable indicates that a single Serial Macro Message will be transmitted when an IR code Trigger Code is received, but subsequent messages will not be transmitted until the user releases the IR remote and presses it again.
Note 4: 0h = 1200
1h = 2400
2h = 9600
3h = 14400
4h = 19200
5h = 28800
6h = 38400
7h = 57600
8h = 115200
Note 5: Bitmap indicating which Hardware Zones (Zones A, B, C, D, E or F) to allow RS-232 data to be output. If the bit is set, the data will be output.

Zone A	01h
Zone B	02h
Zone C	04h
Zone D	08h
Zone E	10h
Zone F	20h

Thus an output mask of 2Bh would allow serial macros to be output on Zone A, Zone B, Zone D and Zone F, but NOT on Zone C and Zone E.

NOTE: The serial macro is always transmitted out the "primary" serial port connection, i.e. the RJ45 connector. An output mask of 00h will mask all data to the Hardware Zone outputs, but the macro will still be transmitted to the primary serial port.

Note 6: There is 2000h, 8192 decimal, bytes allocated in non-volatile memory for use by the serial macros. Each macro consumes:

1 byte	Macro Number
2 bytes	Macro Length
1 byte	Macro Trigger ID
1 byte	Macro Trigger Code
1 byte	Macro Scrollable and BaudRate
1 byte	Macro Output Mask
+	
x bytes	Macro Message Message Length

As an example, a macro message of "Hello World" would consume 7 + 11 bytes of memory.

Thus the amount of memory available for a macro is variable, depending upon what other macros currently exist. In the one extreme case of the largest single message, one could create a single macro with a message length of 8185 characters.

NOTE: Although the Serial Macro structures can accommodate very large string lengths, the practical limit for macro message length is approximately 2000 bytes. This is due to the fact that the receive buffer in the unit is only 2048 (2k) bytes long, and processing of the message cannot occur until the entire message is received. Thus it is not possible to send a valid BKC-DIP message to a CT610/310/600 of length longer than 2048 bytes. Taking into account the syntax overhead of BKC-DIP (receive ID, checksum, open/close parenthesis, etc.) leaves approximately 2000 bytes for an actual Serial Macro message. Should this become an issue, create 2 independent macros with the same trigger IDs and trigger codes. The macro number will determine the priority of the macros with matching trigger conditions, with lower macro numbers having the higher priority.

In the other extreme case of maximum number of macros (255, macro numbers 0h through FEh), each macro would have a message length of 25 characters.

NOTE: If a macro is too large for the available space, it is not accepted. Monitoring the maximum free space is recommended by reading the Macro Free Space MSB and LSB (see Note 8 below) to indicate how much available macro space is available before attempting to write a macro message.

Note 7: **READ ONLY PARAMETER** indicating size of the specified serial macro. Since the macro's size can be greater than 255 bytes, 2 bytes are required to represent the size, MSB (most significant byte) and LSB (least significant byte). To form the size, perform the following calculation:

Size = (MSB Value * 256) + LSB Value

As an example, assume the MSB and LSB return values were 10h and F3h respectively.

Size = (10h * 256) + F3h
Size = (16 * 256) + 243 = 4339 bytes

The other way to form the complete size is to concatenate the MSB and the LSB hexadecimal characters. Using the above example:

Size = 10F3h = 4339 bytes

Note 8: **READ ONLY PARAMETER** indicating remaining free space in the serial macro area. Since the free space in the serial macro area can be greater than 255 bytes, 2 bytes are required to represent the size, MSB (most significant byte) and LSB (least significant byte). To form the size, perform the following calculation:

Size = (MSB Value * 256) + LSB Value

Or by concatenating the MSB and LSB hexadecimal characters together. See Note 6 above for examples.

Appendix P, Override Parameters

(0,G,O,0;*cs16*) Example of Get Override Active state
(0,S,O,4=1;*cs16*) Example of Set Echo Enabled

Parameter Identifier (in hex)	Description	Default Values (in hex)	Parameter Max Values (in hex)	Formatting Notes
00	Override Active	0	1	Note 1
01	RS-232 Baud Rate	2	8	Note 2
02	BKC-DIP Receive ID	00	7F	Note 3
03	BKC-DIP Transmit ID	00	7F	Note 3
04	BKC-DIP Echo Enabled	0	1	Note 1
05	BKC-DIP Feedback Selection	0	3	Note 4
06	Front Panel Buttons/Switch Locked	0	1	Note 1*
07	Front Panel IR Remote Locked	0	1	Note 1
08	RS-232 V2.0 Enabled	0	1	Note 1
09	OSD Reply Mode	0	2	Note 7
0A	Front Panel Display Reply Mode	0	2	Note 7
0B	Auto BKC-DIP Set IR Generate Enable	1	1	Note 4
0C	Auto BKC-DIP Set IR Mask	3F	3F	Note 8
0D	Auto BKC-DIP Set IR TX ID	80	80	Note 6
FF	Override Timeout	0	FF	Note 5

Appendix P, Override Parameters Notes

(0,G,O,0;*cs16*) Example of Get Override Active state
(0,S,O,4=1;*cs16*) Example of Set Echo Enabled

Note 1: 0h = No, 1h = Yes *(Front Panel commands do not apply to a CT600)
Note 2: 0h = 1200, 1h = 2400, 2h = 9600, 3h = 14400, 4h = 19200, 5h = 28800, 6h = 38400, 7h = 57600, 8h = 115200
Note 3: Valid IDs are 00h to 7Fh. Receive IDs must be unique (to avoid ambiguity)
Note 4: 0h = Disabled, 1h = Update, 2h = Reply, 3h = Both
Note 5: 0h = No timeout, 1h = 0.1 second timeout … FFh = 25.5 second timeout
Note 6: 00h to 7Fh map directly to Transmit IDs 00h to 7Fh. 80h maps to the Global Transmit ID FFh.

Note 7: 0h = BKC-DIP V1.0 compliant, 1h = BKC-DIP V2.0 compliant with no attributes, 2h = BKC-DIP V2.0 compliant with attributes.

Note 8: Bitmap indicating which Hardware Zones (Zones A, B, C, D, E or F) to allow RS-232 data to be output. If the bit is set, the data will be output.

```
Zone A   01h
Zone B   02h
Zone C   04h
Zone D   08h
Zone E   10h
Zone F   20h
```

Thus an output mask of 2Bh would allow serial port data to be output on Zone A, Zone B, Zone D and Zone F, but NOT on Zone C and Zone E.

NOTE: The serial port data is always transmitted out the "primary" serial port connection, i.e. the RJ45 connector. An output mask of 00h will mask all data to the Hardware Zone outputs, but the data will still be transmitted to the primary serial port.

Appendix Q, Status Messages

```
(0,U,S,0="BKC-DIP ACTIVE";05FE)     Example Status Message
```

Message Number	Message	Indication
0	(*receiveID*,U,S,0="BKC-DIP ACTIVE";*cs16*)	BKC-DIP interface is active an the Device is ready to accept BKC-DIP commands
4	(*receiveID*,U,S,4="*za zb … zn*";*cs16*)	String containing current Logical Zones in system, delimited by whitespace. For example default CT610 and CT600 zones: (0,U,S,4="0 B C D E F 10";)
5	(*receiveID*,U,S,5="P*z=nn*"; *cs16*)	Logical Zone *z* Preset *nn* updated, where *z* can range from 0h – 80h, and *nn* 0h – FEh
5	(*receiveID*,U,S,5="S";*cs16*)	System parameters updated